

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.

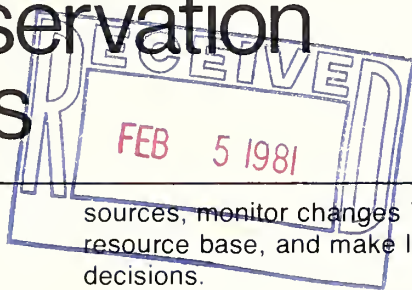


United States  
Department of  
Agriculture

Soil  
Conservation  
Service



# Soil & Water Conservation News



3	Comments From the Chief
4	News Briefs
10	Management Tips
14	Conservation Research Roundup
16	Meetings
16	New Publications

## SCS Provides Worldwide Conservation Assistance

by Nancy M. Garlitz

In fiscal year 1980, agencies of the U.S. Department of Agriculture were involved in 125 projects to help lesser developed countries produce food and fiber from limited resources and improve the quality of life. The USDA Soil Conservation Service alone has people on resident assignments in Pakistan, Saudi Arabia, The Gambia, Tunisia, Botswana, Nepal, and Haiti. A project in Nigeria is still in the planning stage.

In countries suffering from lack of water, severe erosion, or poor land use, soil and water conservation experts from SCS advise on the proper use of resources to increase crop and livestock production. SCS is also providing assistance in remote sensing to lesser developed countries to help them evaluate their natural re-

sources, monitor changes in the resource base, and make land use decisions.

USDA's Office of International Cooperation and Development (OICD) coordinates international activities within the Department. SCS, working through OICD, has been assisting the Government of Pakistan in developing more efficient ways of using the limited water resources. The project has included helping the Pakistanis to improve several hundred small, onfarm watercourses. The improvements have included lining sections of the watercourses with brick and concrete to reduce water losses. In addition, several thousands of acres of agricultural land were precisely leveled to improve onfarm irrigation efficiency.

In Saudi Arabia, SCS participated in completing a soil survey for the Wadi Dawasir area, the initial project in an ongoing kingdom-wide soil survey program. SCS is also providing technical assistance in soil and water management in The Gambia, livestock feed and production in Tunisia, crop production and marketing in Botswana, and interpreting soil data in

relation to land use capability and potentials in Nepal.

SCS has recently begun assisting the Ministry of Agriculture in Haiti to control the country's severe soil erosion problem. Project workers will be concentrating on developing overall watershed management programs, designing soil and water conservation practices, and instructing Haitian farmers in the use and maintenance of the practices. The project is scheduled to run for about 3½ years.

In Nigeria, USDA teams identified the need for projects in river basin development, soil survey, natural resource inventory, soil and water conservation, and agricultural planning. OICD and SCS are implementing a \$1 million comprehensive soil survey of the country, to be funded on a reimbursable basis by the Government of Nigeria. The project will involve a soil mapping team which will include three soil scientists and a cartographer on resident assignments.

In addition to providing technical assistance to lesser developed countries, SCS also participates through

Continued on next page.

## SCS Supports International Program for Soil Management

The U.S. Department of Agriculture is increasing its assistance in renewable resource management to lesser developed countries through the Agency for International Development (AID). As part of the growing involvement, the Soil Conservation Service is providing field support for lesser developed countries in inventorying their agricultural resources and evaluating their potential capacity to produce agricultural products.

SCS is providing the assistance through the Soil Management Support Services Program with funding from AID. The program has two parts:

1. A central office, with a permanent

staff, to expand *Soil Taxonomy* for relevance to tropical and subtropical soils. *Soil Taxonomy* is the system of soil classification used by USDA and written by SCS.

2. A consulting service for lesser developed countries seeking 30-day, temporary, technical assistance in classifying soils according to *Soil Taxonomy* and in the proper use and management of land resources.

Klaus W. Flach, SCS associate deputy chief for natural resource assessments, is the principal investigator; Hari Eswaran is program leader, SCS, Soil Management Sup-

Continued on next page.

*Soil and Water Conservation News* is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1985. *Soil and Water Conservation News* (ISSN-0199-9060) is published 12 times a year. Controlled circulation postage paid at Washington, D.C.

#### Reprint permission

Contents of this magazine may be reprinted without special permission. Credit is not required but is appreciated. Photos available on request.

#### Commercial names

Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the U.S. Department of Agriculture.

#### Subscriptions

\$10 per year, \$12.50 foreign. Single copy domestic, \$1.25; foreign, \$1.60. Discounts of 25 percent on orders of 100 or more sent to the same address. Order directly from:

Superintendent of Documents  
U.S. Government Printing Office  
Washington, D.C. 20402

#### SCS Provides Worldwide Assistance, cont.

OICD in the training of foreign agriculturists in applying soil and water conservation practices and setting up effective conservation programs. Also, in the last 2 years, OICD has received funding from Congress to carry out a program of science and technology exchange.

In a reciprocal science and technology exchange with the People's Republic of China (see article on page 1 of the August 1980 issue of *Soil & Water Conservation News*), four SCS leaders spent 5 weeks in China this past fall. They were part of a U.S. team studying the Ministry of Water Conservancy's work in flood control, irrigation and irrigation water management, hydropower production, soil erosion, and research activities related to soil and water management.

"The United States can adopt much of what the Chinese are doing in the way of small-scale hydropower production," says one team member, Paul Howard, SCS deputy chief for Technology Development and Application. "The Chinese have installed dams on their water irrigation projects

to produce electricity. For example, on a 50,000- to 100,000-acre irrigation project, the Chinese have 15 to 20 small-scale hydropower plants."

As part of its work in reclaiming the land devastated by the eruption of Mount Saint Helens, SCS proposed a technology exchange with Costa Rica. Mount Irazú, a volcano in Costa Rica, had erupted in the early 1960's, and scientists and technicians have gained valuable experience in re-vegetating ash-damaged land.

In October 1980, a team of Costa Rican scientists viewed the Mount Saint Helens' area and said the environmental problems were similar to the ones they had encountered after the eruption of Mount Irazú. Comparing the effects of the two volcanos and discussing successful land treatment around Mount Irazú helped U.S. scientists to make predictions on what environmental changes may take place around Mount Saint Helens and how to deal with them. The Costa Ricans stressed the need for establishing some kind of vegetative cover as soon as possible to protect the soil.

Last month, a U.S. team of spe-

cialists visited Costa Rica to view the Mount Irazú area. The exchange marks the first time SCS has asked a lesser developed country for technical assistance.

SCS is reimbursed for the costs of its international activities by OICD. The primary funding source for USDA agricultural assistance to developing countries is the U.S. Agency for International Development. Other organizations concerned with food and agriculture in developing nations—the international development banks, the Food and Agriculture Organization (FAO) of the United Nations, the Organization of American States, and individual national governments—can also contract for USDA technical resources and services on a reimbursable basis. USDA scientific exchanges with cooperating countries are funded by various methods, including special cost-sharing trust funds.

Nancy M. Garlitz,  
associate editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

#### SCS Supports International Program, cont.

port Services Program, and Tej Gill of AID is project monitor.

The establishment of the 1-year-old Soil Management Support Service Program is the result of resolutions adopted at the 1978 International Crop Research Institute for the Semi-Arid Tropics workshop at Hyderabad, India, on Operational Implications of Agrotechnology Transference Research. At the workshop, scientists from all over the world, representing such organizations as the Food and Agriculture Organization of the United Nations, the International Rice Research Institute, AID, the

World Bank, and various agencies in lesser developed countries, concluded that solving world food problems requires a common international language for describing soils to facilitate agricultural planning and development. They also concluded there is a need for an international center for coordination and cooperation among governments and agricultural agencies to make international agrotechnology transference a reality.

SCS is working through the Soil Management Support Services Program to increase the transfer of soil management technology by revising

*Soil Taxonomy* to classify tropical and subtropical soils more accurately. The revision of *Soil Taxonomy* is being coordinated by the international soils program staff. The staff will make and review proposals for the revision, maintain a file of the proposals, give guidance to international meetings of experts in soil classification, and publish proceedings.

A research soil scientist on the staff will help develop procedures for sampling, analyze samples, and maintain a data bank of soil samples from tropical and subtropical areas.

Also through the Soil Management Support Services Program, SCS is



Bob Bergland  
Secretary of Agriculture

Norman A. Berg, Chief  
Soil Conservation Service

Prepared by Information and Public Affairs  
Soil Conservation Service  
U.S. Department of Agriculture  
Washington, D.C. 20013

Editor, Judith E. Ladd

Associate Editor, Nancy M. Garlitz

Assistant Editor, Donald L. Comis

Editorial Assistant, Ann McQuitty

Design Consultant, Christopher Lozos

All programs of the U.S. Department of Agriculture are available to everyone without regard to race, creed, color, sex, age, or national origin.

## Comments: from the SCS Chief

The Soil Conservation Service is not only the authority on soil and water conservation and soil surveys and mapping in the United States, but it is also becoming recognized as the authority in these areas internationally. SCS is continually called upon by the Agency for International Development (AID) and other international organizations to share our conservation knowledge with other countries suffering from acute soil and water problems.

To help meet these growing demands, I have assigned a new international activities staff to develop and implement SCS policies and procedures for providing technical assistance to other nations and to plan and coordinate academic and on-the-job training for officials, scientists, and technicians from other nations.

One of the agency's goals is to include more SCS professional and technical people in its international activities. This has already begun with the assignment of two soil conservation technicians to Haiti to work on a soil conservation and water management program. Currently, SCS has staff members on resident assignments in Tunisia, The Gambia, Botswana, Saudi Arabia, Nepal, Pakistan, and Haiti. (See article beginning on page 1.) Numerous staff members also travel to other countries on short-term assignments.

Lesser developed countries need the kinds of technical assistance SCS offers to help them reap the most from their available resources while protecting those resources for future use.



providing short-term technical assistance in soil surveys, land use planning, and soil conservation and management, primarily in tropical and subtropical countries. Assistance through the program can include:

- Helping countries establish policies and programs for solving problems in land use and food and fiber production;
- Helping plan, carry out, and evaluate soil surveys, and soil conservation programs;
- Providing laboratory and field testing services;
- Publishing soil management information that is needed in land use

planning and for food and fiber production;

- Conducting seminars and other training sessions on improving soil management and on classifying soils;
- Interpreting soil properties to determine the potential of the soils for agriculture and predicting their response to management; and
- Disseminating new ideas for increasing soil fertility, improving plant nutrition, and controlling soil erosion and sedimentation.

Adapted from an article on page 1 of vol. 3, No. 3-4, *Benchmark Soils News*.

## SCS Cited in USDA Award

SCS in January was singled out for notable achievement in examining and certifying professional conservationists when the Office of Personnel Management (OPM) gave the Morris Udall-Edward Derwinski Award to USDA. OPM recognized the work of several USDA agencies in decentralizing examination of professionals in conservation and other disciplines. SCS was the first USDA agency to do examining on a nationwide basis. Its examining unit is a model for other agencies.

# News Briefs

## Are We Running Out of Graduates?

A report prepared by the Office of Higher Education, Science and Education Administration, U.S. Department of Agriculture, indicates that there could be a serious shortage of graduates of higher education in the food and agricultural sciences over the next 5 years.

As stated in the report, "Current and projected supplies of graduates with advanced degrees do not appear to satisfy employment demand.

"To strengthen the food/agriculture labor force, the United States needs more master's graduates in agricultural business and management, agricultural engineering, animal sciences, food sciences, natural resources, plant sciences, and soil sciences. At the doctoral level, we need more graduates in agricultural business and management, agricultural engineering, animal sciences, food sciences, forest engineering, forest products utilization, plant sciences, and soil sciences."

Single copies of the report, "Graduates of Higher Education in the Food and Agricultural Sciences: An Analysis of Supply/Demand Relationships," are available free from the U.S. Department of Agriculture, Science and Education Administration, Information Staff, Publications Request and Distribution, Washington, D.C. 20250.

## SCS Shows Gains in Minority Employment

Equal employment opportunity is one of the Soil Conservation Service's highest priorities. SCS is committed to setting goals and reaching equitable numbers of minorities and women

in each State, to make its employment mix more nearly comparable to the population mix.

SCS employment of minorities increased from 1,410 in fiscal year 1979 to 1,521 in 1980, or 11.5 percent of the full-time work force. According to David Montoya, SCS director of equal opportunity, the number of Blacks rose from 891 to 964; American Indians, 127 to 150; Asian Americans, 56 to 59; and Hispanics, 336 to 348. During the same time, total SCS full-time employment decreased nearly 500.

National office minority employment now exceeds 20 percent.

SCS is working closely with high schools and colleges and with the 1890 Land Grant University system to interest more young people in conservation careers, and to give them experience in soil and water conservation.

SCS is striving to attract and motivate the kinds of people needed for all agency jobs in meeting America's social and environmental goals.

**Ted Kupelian,**  
writer-editor, Information and  
Public Affairs, SCS, Washington, D.C.

## Workshop for Minority Recruitment

USDA's Soil Conservation Service and Forest Service along with Colorado State University offered a unique focus on minority recruitment.

Twenty-five students from Colorado State University, Colorado high schools, and the Ute Mountain Indian Reservation participated recently in a field workshop which took place in the rustic, natural setting of Pingree Park, a part of the Colorado State University campus located on the edge of Rocky Mountain National

Park. The 2-day workshop, held last October, featured field demonstrations by the Federal agencies' personnel. Demonstrations were given in the areas of soil science, forestry, range science, biology (wildlife and fisheries), engineering, and agronomy.

This was the first Pingree Park event; and due to its success, plans are underway to make it an annual event.

The numerous career possibilities with the Soil Conservation Service and the Forest Service were attractive to students of a variety of science-related educational backgrounds. Many of the students expressed interest in pursuing a career in one of these areas and confessed they had not known about these career options before the workshop.

The Soil Conservation Service and the Forest Service are interested in attracting persons into these professions and will consider immediate employment opportunities for these students either in the high school Cooperative Education Program, Federal Junior Fellowship Program, or the Student Trainee Program.

**John Montoya,**  
personnel specialist, SCS,  
Denver, Colo.

## Soil Conservation Is Front-Page News in Iowa

Based upon its extensive examination of what the people of Iowa want their State to be like 10 years from now, the *Des Moines Register* listed soil conservation third on an eight-item agenda, "Iowa in the '80s: A People's Agenda."

A front-page article in the November 9, 1980, edition of the newspaper explained how two *Register* reporters

spent 6 months assessing the wants of various individuals and interest groups. The goal was to produce a list of specific ideas that could make Iowa a better place to live. In addition to soil conservation, the items on the list included land use, the elderly, the railroads, energy, the cost of health care, the quality of the educational system, and a special Iowa holiday—an idea that focuses on Iowa itself as well as on family life in the State.

The item on soil conservation stated: "Erosion of Iowa's topsoil must be stopped. We need a massive program: more money for permanent land improvements, more personal counseling of farmers by conservation specialists, and use of the property tax system to spur conservation."

A followup article on the soil conservation item appeared in the November 16 edition of the newspaper.

---

## **Public Opinion on Environmental Issues**

The following are the introductory remarks by Gus Speth, chairman of the Council on Environmental Quality, in the publication "Public Opinion on Environmental Issues—Results of a National Public Opinion Survey":

"This study of U.S. public opinion on a variety of environmental issues was commissioned by the Council on Environmental Quality and components of three other Federal agencies—the Department of Agriculture, the Department of Energy, and the Environmental Protection Agency. Our purpose in commissioning the poll was to learn about key public opinion trends over the past decade, to obtain information about new areas of environmental concern and the degree of support for

environmental protection, and to determine public responses to difficult choices between environmental protection and other values.

"The survey found that the United States is, by and large, a Nation which is willing to pay the price for environmental quality. We are a people deeply concerned about the presence of toxic chemicals in our environment. We want the government to test and regulate new chemicals before they are allowed on the market. We prefer environmentally benign energy sources—such as conservation and solar energy—to sources that pose health risks and other dangers. And we are more concerned about living near nuclear power plants and hazardous waste dumps than we are about living near power plants fired by coal. We still care very much about saving endangered species and protecting our fragile wetlands. On the other hand, while we still have a sustaining commitment to cleaning up air and water pollution and solving other environmental problems, they are no longer viewed as crisis issues by most Americans, whose top concerns now relate to inflation and the energy shortage.

"This poll, one of the most extensive and probing surveys on environmental issues conducted to date, greatly increases our understanding of public opinion about energy, regulatory, and economic problems as they relate to environmental concerns. The results of the poll should be useful to government officials and citizens alike as we work together to build an environmentally sound and sustainable future for our Nation."

In closing, the publication states, "The overall impression given by the Resources for the Future survey and

by the other polls at the end of the 1970's is that far from being a fad, the enthusiasm for environmental improvement which arose in the early 1970's has become a continuing concern—a concern which shows every sign of remaining for the foreseeable future."

The publication is available for \$3.75 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. (Stock No. 041-011-00052-1.)

---

## **New Journal, Soil & Tillage Research, To Be Published**

*Soil & Tillage Research* is a new international journal on research and development in soil tillage and field traffic, and their relationships with soil environment, land use, and crop production.

The journal will be edited by C. van Ouwerkerk at the Institute of Soil Fertility in The Netherlands, and will be published in collaboration with the International Soil Tillage Research Organization.

It should be of interest to soil scientists, plant scientists, agricultural engineers and economists, agronomists, weed specialists, and others.

For further information contact the Elsevier Scientific Publishing Company, P.O. Box 211, 1000 AE Amsterdam, The Netherlands.

---



## Juniper Study to Provide Better Trees for the Great Plains

A Montana interagency group is participating in the first extensive improvement study of Rocky Mountain juniper and Eastern redcedar in the United States.

"As a start, we planted 1,000 seedlings last spring," said Harold Hunter, chairman of the Montana Interagency Tree or Shrub Improvement Study (MITOSIS). Hunter is also the State woodland conservationist for the Soil Conservation Service in Bozeman, Mont.

The juniper study was initiated by the Great Plains Agricultural Council, which surveyed nurseryowners and others who work with trees and shrubs for windbreaks. The results of the survey revealed a need for improved Rocky Mountain juniper and Eastern redcedar.

"People recognized that there was a lot of variation in these species," explained Hunter, "and that variation indicated there is substantial opportunity to improve the species performance by selecting the very best trees for future seed stock."

Despite the fact that junipers are indigenous, hardy, and relatively drought, insect, and disease resistant, little has been done to study their performance and adaptability on agricultural land over the Great Plains region or to improve them genetically.

The Forestry Committee of the Great Plains Agricultural Council, a multi-State group dedicated to improving agriculture of the Great Plains, is coordinating the effort. Thirteen other plantings were made in Colorado, New Mexico, Texas, Oklahoma, Kansas, Missouri, Nebraska, North Dakota, and South Dakota.

MITOSIS is the logical group to head the project in Montana. It was formed in 1975 to speed up the selection of improved trees and shrubs for conservation purposes by combining the programs and resources of several agencies. MITOSIS represents the Division of Forestry of the Montana Department of Natural Resources and Conservation; USDA's Forest Service, Soil Conservation Service, Science and Education Administration—Extension Service; Montana University System and Agricultural Experiment Station; and others.

Seeds were collected from more than 225 trees that members of the Great Plains Agricultural Council identified in the Great Plains as outstanding individuals. In Montana, employees of SCS and the Division of Forestry collected seeds from 24 Rocky Mountain juniper trees.

No Eastern redcedar trees were identified in Montana; their usual range is in the southern Great Plains States although there are small stands in the western Dakotas. Project participants hope the study will show collections of the two trees that are adapted to other areas.

"The seed was sent to USDA's Forest Service Bessey Nursery, Halsey, Nebr. They grew the seedlings that we planted this spring," Hunter explained.

The 1,000 seedlings planted in Montana represent seed from the 24 trees collected in Montana, as well as Eastern redcedar and Rocky Mountain juniper from the southern tip of Texas to the Dakotas.

All the planting in Montana is on 4 acres of the SCS plant materials center near Bridger. The center is owned by the conservation districts of Montana and Wyoming and is operated by SCS.

The SCS staff will do most of the evaluation which is "primarily survival and rate of growth," Hunter said, "but certainly other factors will enter in, like density of foliage, resistance to insects and disease, and overall vigor."

According to Hunter, it will be at least 10 years before tangible results will be available. "It's just a fact of life—trees and shrubs grow slowly. These seedlings won't be producing seed until they're 5 or 6 years old," he explained.

By the end of the 10 years, however, the superior species will be identified and more seed will be collected for field tests throughout the Great Plains. These field plantings will allow another evaluation of how the trees adapt to different soils and climate.

Rocky Mountain juniper and Eastern redcedar that excel in the field trials will be recommended as superior seed stock for windbreaks, wildlife habitat, feedlot protection, and erosion control. The Bridger Plant Materials Center will maintain a source of seed or planting stock for commercial nursery production. The commercially produced selections will then be available for use on Great Plains farms and ranches.

**Brad Anseth,**  
public information officer,  
SCS, Bozeman, Mont.

---

## Rails to Trails

A group of citizens in northwestern New Jersey is converting more than 130 miles of abandoned railroad rights-of-way to trails for bikers, joggers, and walkers.

The citizens' group is called Recycling Railroads, Inc. It was formed to support a "Rails to Trails" idea



presented in a report of a Resource Conservation & Development (RC&D) project in 1977. Three people were hired under the Comprehensive Employment and Training Act (CETA) to staff Recycling Railroads, Inc.

Tim Doherty became executive director of Recycling Railroads, Inc., in October 1977 when the group moved into the RC&D office. The Soil Conservation Service through the Sussex-Warren RC&D Council provided administrative assistance until fall 1980. Recycling Railroads, Inc., now has its own office and is supported by CETA and two private foundations.

Tim Doherty worked closely with Kent Hardmeyer who served as the RC&D coordinator for the Sussex-Warren RC&D area.

At the request of the Sussex-Warren RC&D council, Hardmeyer conducted a special inventory of abandoned railroad rights-of-way in Sussex and Warren Counties that resulted in a report presented to interested groups at public workshops. Hardmeyer and Doherty developed plans for their rails to trails program by studying similar programs in Wisconsin. Doherty bicycled on some of the Wisconsin trails during the summer of 1979.

Doherty hopes local businesses may benefit from hungry trail users who may leave the trail for a snack. The trail will be formed by several interconnecting systems of rights-of-way. It goes through urban areas with various businesses nearby.

The original three-person CETA staff included a historian who wrote a history of the abandoned railroad rights-of-way in Sussex and Warren Counties. Recycling Railroads, Inc., plans to develop historical guides and trail guides.

"Our primary purpose is to pre-

serve the rights-of-way in case they are needed for rail service in the future," said Doherty. "There are cinder surfaces on the rights-of-way, and we will maintain them as such." He plans to complete the first 2 miles of trails by fall 1981.

"We're moving along rather nicely. After 3 years, progress is starting to show," Doherty explained.

Donald L. Comis,  
assistant editor, *Soil and Water  
Conservation News*, SCS,  
Washington, D C

---

## **EPA Uses Wastewater to Create Wetlands**

The U.S. Environmental Protection Agency (EPA) is conducting a series of studies with local governments across the country using wastewater to create or preserve wetlands for wildlife and migratory waterfowl.

During fall 1974, Mt. View Sanitary District at Martinez, Calif., established 8 acres of artificial wetlands. In 1978, the wetlands system was expanded to cover a total of 21 acres. The primary purpose of the system was to demonstrate substantial environmental benefits from the use of secondary municipal effluents to create wildlife habitat.

The system has been very successful with 93 species of birds, 75 plant species, 24 species of aquatic invertebrates, and 22 species of other animals using the area. Improved water quality has been an additional benefit.

Wastewater provides valuable nutrients for marsh plants, which in turn provide homes for wetlands animals. Preliminary findings to date indicate no problems with accumulation of toxic materials in plants or animals.

Scientists at EPA's Environmental Research Laboratory in Corvallis,

Oreg., are conducting studies which will help determine the suitability of different types of wetlands for wastewater treatment and to establish a basis for evaluating changes within the system that are caused by wetlands manipulation.

At the University of Iowa, working under a grant funded by the Corvallis Laboratory, scientists are examining the changes in agricultural runoff as it passes through about 80 acres of prairie pothole wetland. Under a similar grant from Corvallis, scientists at the University of Florida are studying the water quality and biological properties of cypress/hardwood dominated wetland ecosystems experimentally loaded with domestic sewage. The sewage, with heavy metals added, is applied in specially constructed "corridors." These manipulations of natural systems will help document the ways substances move through wetlands and what the effects will be.

Working with the San Diego Regional Water Reclamation Agency, EPA is establishing an artificial wetlands at the Padre Dam Municipal Water District in Santee, Calif. The site consists of 14 experimental plots covering an area of about 1 acre. Plant species and wastewater application rates will be tested.

An EPA-funded project with natural wetlands is being carried out in Drummond, Wis., where 30 acres of peatlands are being used to treat municipal wastewater. Treatment effectiveness is measured in relation to hydraulic loading rates and extent of pretreatment.

---

## Western U.S. SNOTEL Network Complete

It's official. The western U.S. SNOTEL network is completed—and operating. Four hundred and seventy-five solar-powered SNOTEL sites attached to radio packages and tucked into the western mountains are now beaming snow water content, temperature, and precipitation information to central computers faster and more frequently and accurately than the manual measurements of past years.

The monthly trek into the mountains to hand measure snow water content has always been demanding and hazardous work. With the SNOTEL network, manual measurements will be gradually decreasing.

SNOTEL (snow telemetry) was conceived well over 5 years ago. The communication system uses natural ionized vapor trails created when sand-sized meteor particles enter the Earth's atmosphere. They burn up and leave a trail of ionized gases that reflect radio signals. When water content, precipitation, and temperature information is requested by a central computer in Portland, Oreg., a radio at one of the two master stations located near Boise, Idaho, or Ogden, Utah, transmits a signal skyward. Typically, within minutes a properly positioned ionized trail is located. The signal bounces down to the SNOTEL site, turns on its radio, and transmits its stored information back to the master station—all within only a fraction of a second.

Soil Conservation Service snow

survey supervisors in State offices originate interrogation of SNOTEL sites using their SNOTEL terminal. The central computer automatically controls the interrogation and continues until ordered to change.

The completed SNOTEL network allows water supply forecasters to more accurately predict spring and summer runoff that supplies the western irrigation systems. SNOTEL also alerts reservoir operators to rapid runoff from heavy rains or higher than normal temperatures that speed snowmelt.

The first 160 SNOTEL sites were installed in 1977, an additional 85 in 1978, and the final 230 in 1980. Cost of the advanced automated system was about \$7.5 million.

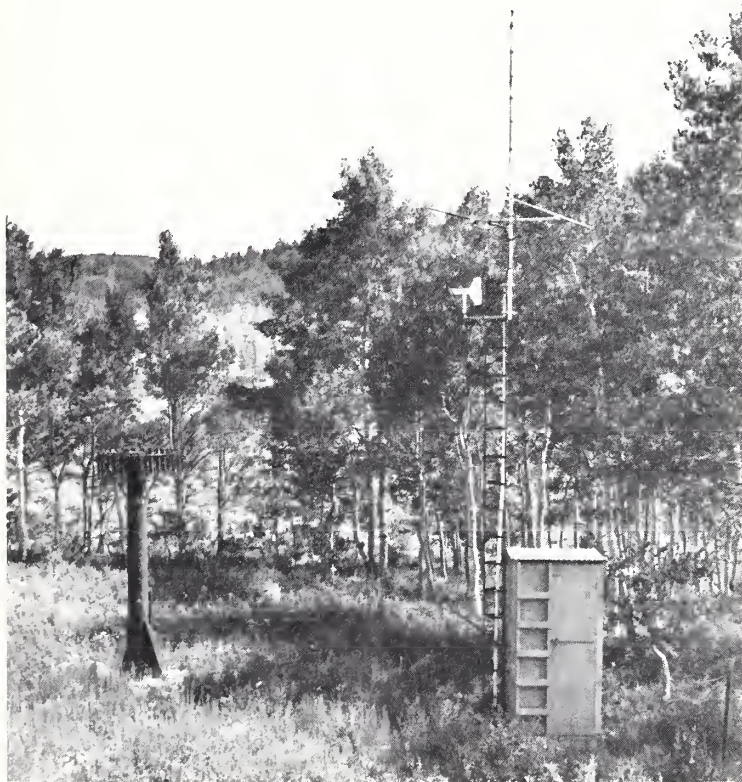
Alaska, in cooperation with several Federal and State agencies, has its own mini-SNOTEL network with 10 SNOTEL sites now in operation and an additional 30 soon to come.

Responding to the need for monitoring Washington's active volcano, Mount Saint Helens, three new sites have been installed on the mountain flanks. The sites will monitor the effect of volcanic ashfall on snowmelt and the resulting runoff of the watersheds surrounding the volcano. The sites will also give river flow forecasters fast information in the event of 1,000° C pyroclastic flows from the crater onto a snowpack, melting it instantly.

Additional SNOTEL sites may be installed if the various cooperating agencies have special needs. But for all current purposes, the SNOTEL network is now complete and producing.

**Manes Barton,**  
head, water supply forecasting staff,  
West Technical Service Center,  
SCS, Portland, Oreg.

This typical SNOTEL site includes a precipitation gage (left), solar panels (atop the antenna tower), dipole antenna temperature gage (white object half-way up the antenna tower), and instrument shelter. Not shown are four stainless steel pillows, filled with a nonfreezing solution, that record snow water content.





## Peace Corps Volunteers Learn About Ponds

Learning everything possible about ponds is an important part of the training for 23 Peace Corps volunteers in Norman, Okla. After 10 weeks of training, this group will go to their assignments in Costa Rica, Kenya, Zaire, and Morocco to help the people in these countries with fish production projects.

All 23 volunteers have college degrees, mostly in biology, but few have had actual experience in constructing ponds. Dr. Howard Clements, who is in charge of the training program, made a request to the Cleveland County Conservation District for help in training the group in pond construction and management. The training was provided by Soil Conser-

vation Service personnel from the Norman field office.

The volunteers spent 1 day with SCS personnel, in an indoor and an outdoor session. In the indoor session, Jim McCampbell, SCS district conservationist, acquainted the group with engineering terms and equipment and explained how ponds are designed and built. He discussed how to locate dams, how to determine the sizes of the dam and spillway, and how to place pipes in some dams to protect the earthen spillway and for pond management.

Part of the outdoor session was spent looking at a constructed pond and discussing its features. Then the group was taught how to determine side slopes and top width of the dam and the location and size of the spillway, and, finally, how to stake the

pond using an engineering level.

The 1-day session won't be all the training the group will receive on building ponds. They will practice the skills taught by SCS over and over as they continue their training program in Oklahoma.

Peace Corps volunteers who have already served tours overseas say this kind of training will be useful and may even be essential when the volunteers reach their assignments. The SCS field office in Norman provides this assistance to about five different groups of Peace Corps volunteers each summer.

F. Dwain Phillips,  
public information officer,  
SCS, Stillwater, Okla.



Far left, Jim McCampbell, SCS district conservationist, instructs Peace Corps volunteers on how to use an engineering level in staking out a farm pond. Near left, Peace Corps volunteer Marie Rose from Allentown, N.J., practices what she's learned about staking farm ponds. Rose will carry out her volunteer work in Zaire.



## Grassed Waterways Need Good Care

Grassed waterways used on many farms to control erosion in drainage-ways will have a "short life" unless someone takes care of them.

Clif Halsey, extension conservationist at the University of Minnesota, offers these tips:

- Inspect waterways and repair damage immediately after heavy rains and spring runoff. Otherwise small gullies may continue to grow and ruin the value of the waterway.
- Mow and remove the grass. Tall grass slows the runoff so much that soil eroded from fields above fills in the center of the waterway. This causes the runoff to flow and gouge gullies along the edges.
- Raise tillage machinery and shut herbicide sprayers off when they

cross waterways. Many grassed waterways are killed by grass herbicides.

Grassed waterways should not be used as field roads, Halsey says. The grass is killed by heavy travel, and ruts which form are turned into gullies by heavy runoff.

Grassed waterways have a short life if the fields above them are farmed so there's excessive erosion. The eroded soil fills in the waterway causing erosion along the edges.

USDA's Agricultural Stabilization and Conservation Service and soil conservation district cost-share programs provide funds for constructing grassed waterways. The districts and the Soil Conservation Service offer technical assistance for design and construction.



Grassed waterways need good care to maintain capacity, vegetative cover, and the outlet.

## Radio Announcements Promote "No-Till"

Firsthand experiences of Hoosier "pioneers in conservation tillage" are featured in a series of radio announcements recorded by the Soil Conservation Service State office in Indiana and released through the State's Rural Radio Network to more than 80 subscriber stations.

On one tape, Jim Barber, a Daviess County farmer and soil and water conservation district chairman, said he practices "no-till" for four reasons: to cut erosion sharply, to reduce fuel costs by more than 90 percent, to save time, and to bring down machinery costs.

Another spokesman is Ron Comer, hybrid corn salesman and Scott County farmer, who said that before he switched to no-till, there were gullies on his farm "big enough to hide a tractor."

Merrill C. Turley, who farms 1,500 acres in Scott County, recalled that as a child he had asked his father why a new crop of rocks appeared in the fields every year. His father told him that the freezing and thawing brought them to the surface.

"He may have been partially right," Turley said, "but the main reason for the rocks was that the soil was washing off, exposing them." He added that with conservation tillage, the soil stays put.

The radio spots are part of a continuing campaign in Indiana to allow farmers who have practiced conservation tillage to share their experiences with other producers in the State. Spots were recorded in the field, usually on the farm.

**Mary Cressel**,  
public information officer,  
SCS, Indianapolis, Ind.

## Iowa Box Shows Soil Loss

The Soil Conservation Service and the Iowa Department of Soil Conservation have designed a display that graphically demonstrates soil loss in Iowa. Lynn Betts, SCS public information officer, Des Moines, Iowa, built the first display model with Keith Glandon, SCS area conservationist in Des Moines. In 1979, using RCA funds, the Department of Soil Conservation bought 105 displays to be used throughout the State.

The display, a rectangular box more than 17 inches high, 8 inches wide, and 18 inches long, is formed by stacking four removable plastic sheets. When the sheets of varying thicknesses are stacked, they form a viewing side that is 18 inches long and more than 17 inches high. The surfaces on the viewing side are painted and molded to look like soil. They show viewers the soil profile as it would have looked in Iowa 100 years ago.

The viewing surfaces of the top three sheets are painted black to look like rich topsoil. The bottom sheet is mostly black with brown at the bottom to indicate the beginning of the subsoil.

The top sheet is 8 inches thick and has artificial grass glued to the top surface. When it is removed, it represents the topsoil lost in Iowa on sloping land in the past 100 years. The second sheet is an extremely thin sheet of plastic to illustrate the one-fourteenth of an inch of soil lost each year on sloping ground in Iowa. The third sheet is 1-inch thick and shows the amount of soil that will be lost in 14 years at the current rate of erosion. The 8-inch-thick bottom sheet shows how much topsoil is left before the subsoil begins.

Betts estimates a model can be built for less than \$50. He and Bill McGill, at the Iowa Department of Soil Conservation, would like to build another model with clear thermoplastic. They envision a hollow sheet, 1-inch thick, filled with pebbles or BB's that would drain out of a hole to demonstrate soil loss dynamically. A thin slice would pull out on one side to demonstrate sheet erosion.

The director of the Iowa Department of Soil Conservation used the display to show State legislators the problem of soil loss. SCS State Conservationist for Iowa, William J. Brune, also used the display when he appeared on a Des Moines television show. Teachers, school children, Lions Clubs, and other civic organizations have seen the display in special presentations.

"As each sheet is removed from the display," Betts explained, "we can simulate the progressive erosion of 100 years in just a few minutes."

**Donald L. Comis,**  
assistant editor, *Soil and Water Conservation News*, SCS, Washington, D.C.

This slide viewer offers a low-cost way to show slides even in brightly lit areas.

## Homemade Slide Viewer Travels to County Fairs

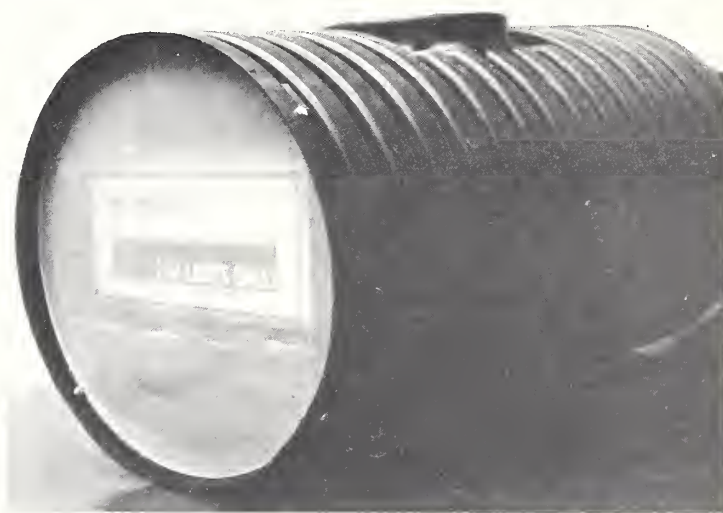
A homemade slide viewer suitable for county fairs and other brightly lit areas costs less than \$10 for materials and requires only a few minutes to assemble.

Designed by Melvin V. Boyer, SCS district conservationist at Wabash, Ind., the viewer is made from a 3-foot section of 12-inch plastic corrugated nonperforated drainage tubing. A piece of frosted glass is cut round to fit into one end of the tubing and held in place, frosted side in, with four sheet metal screws. A 35 mm slide show is projected through the open end of the tubing and focused on the ground glass, where it makes a clear, bright picture under normal lighting.

The tube may be left black or decorated with stripes of fluorescent paint or colored adhesive tape.

Slides should be inserted into the projector backwards, however, so that lettering, etc., will appear correctly on the frosted glass.

**Mary Cressel,**  
public information officer,  
SCS, Indianapolis, Ind.





# Preserving Prime Farmland Topic at Kansas Symposium

by Fred Trump

Nearly 200 persons attending the recent Prime Agricultural Lands Symposium at Salina, Kans., heard some practical ideas on preserving as much prime farmland as possible, while allowing nonfarm development in an orderly fashion. The conference was sponsored by the Salina Chapter of the Soil Conservation Society of America and the Kansas Association of County Planners.

"By the year 2000 we will have shortages of some foods in this country. We will experience food lines much as we experience gas lines," declared Robert Binder of Hays, president of the Kansas Association of Conservation Districts. "You simply cannot take 3 million acres out of production in the United States each year, 1 million of which is prime farmland—or 100 acres a day in Kansas—and not experience big trouble.

"American people treat land as though it were dispensable, because when this country was settled not many years ago, there was an abundance of land. In recent years technology has taken over. Consequently our bellies and our granaries are full. The American people like to do things in a big way. Architects and engineers design for beauty. A criterion for beauty is vastness and open space.

"There are many more ways that prime farm ground is wasted. Everyone now wants 1 to 5 acres to build a home on. Half of the land inside the Nation's 106 largest cities is either vacant or unused. There are two reasons for this—inflated prices, even in burned-out slums, and local and State tax policies that impose heavy penalties for improved properties.

"Another example is Federal grant programs. I know cities in Kansas

that are developing large airports when the need is not there. They are doing it simply because they can get a grant from Washington. Another reason is local planning commissions that find it very difficult to deny a citizen the right to develop his land for housing and to make enough money to retire on. Also, the equivalent of 3 million acres is lost annually because of soil erosion."

Binder had some solutions to suggest: "Each unit of government needs a policy on the issue, starting at the bottom and working up," he said. "Landowners need some incentive for holding land in agricultural production, such as tax relief and development rights. Probably the best way is to assure them a fair return in the marketplace. State and Federal governments should change the highway policies and use as little land as possible, while still providing safety, rather than developing vast areas on both sides that may look nice but have no real value. There should also be a required agricultural impact statement for all projects that use tax dollars."

Howard Tankersley, director of land use for the Soil Conservation Service in Washington, D.C., stated that the quality of farmland covers a wide spectrum. It varies from the very best, which USDA defines as prime farmland, to land that is marginal for producing crops. The poorer quality land, he said, can be helped to overcome its crop yield limitations by use of more energy in the form of fuel, fertilizer, chemicals, and irrigation. This is costly, and the increased soil erosion from farming steeper slopes is a permanent loss of resources.

"It seems prudent," he continued, "to examine the land suitable for raising crops, to decide what might be done to insure the most dependa-



ble supply of crops to meet domestic and world needs, and to further insure that this essential product is produced at the least cost to the producer and the consumer and with the minimum of damage to our natural resource base. The most recent source of information is the 1977 National Resource Inventory conducted by the Soil Conservation Service. The study shows 346 million acres defined as prime farmland. Two-thirds of that prime farmland is being used for crops, and one-fifth is being held for nonfarm uses. The margin of land available for future crop production is too narrow to permit the squandering to necessary uses that can be accommodated on land outside the cropland base.

"The Administration is already committed, in legislation and Federal policy, to discouraging further urban sprawl. This is primarily for the benefit of urban residents—to give them better services, greater economy, and more attractive environments at less cost. The diminished pressure on surrounding cropland is a welcome bonus of this policy. The planning of land use is essentially a task of private landholders and local governments operating within State laws. These landholders and governments must make the decisions that will guide land use patterns in their jurisdiction. The Federal Government has a responsibility to provide a national perspective so that individual citizens and State and local governments can make informed judgments on land use and to eliminate the incentives provided in Federal programs that encourage unwise use of the land and related natural resources.

"Conclusions from the 1980 National Agricultural Lands Conference, sponsored by Resources for the Future, Inc., suggest that we will proba-

bly have an adequate supply of land to produce food, feed, forage, and fiber for *domestic consumption* through the year 2000. However, if projected demands for exports to meet the world's growing demand are considered, the picture changes."

Tankersley concluded that "prime farmland is that land best suited for production. It is in our national interest to protect our limited supply. For this reason the U.S. Department of Agriculture joins forces with other Federal agencies to discourage the conversion of prime farmlands wherever there are practical alternatives to meet legitimate growth and development needs of our communities."

James Johnson, director of the Farmland Preservation Unit, Wisconsin Department of Agriculture, told of efforts to preserve prime farmland. The Wisconsin Farmland Preservation Law, he said, combines tax relief for farmers with incentives for local governments to adopt agricultural preservation plans and exclusive agricultural zoning ordinances. It is unique because preservation is achieved with traditional land use tools at the local level.

According to Johnson the following concepts seem to be most responsible for favorable response and participation:

- Tax relief in the form of a "circuit breaker" credit against State income tax.
- Having an initial "startup" phase and a second "permanent" stage.
- Areas of greater development pressure (urban counties) being required to have stronger preservation programs.
- Having tax incentives increase as the method of preservation becomes stronger.
- Having implementation at the local

level, with the State's primary role being to assist local government.

- Using agricultural preservation plans to identify preservation and development areas.
- State grants to counties to assist in the county planning and mapping projects.

William Toner, professor of environmental planning, Governor's State University, Park Forest, Ill., reported on his studies of agricultural zoning in 96 communities across the Nation. Preserving prime farmland, he said, is being helped by:

- Policies of treating agriculture as a permanent land use.
- Having designated development zones.
- Protecting farm operations from harassment and vandalism resulting from urban pressures.
- Establishing exclusive agricultural zones.
- Having farmers play a key role in planning policy.
- Using SCS soil survey data and similar resource information.

Binder concluded the conference by urging landowners and others to become involved in planning land use at the local level.

---

**Fred Trump,**  
public information officer,  
SCS, Salina, Kans.

---

# CONSERVATION Research Roundup

## Minimum Tillage, Double Cropping, and Controlled Traffic

The increasing cost of energy and the loss of soil by erosion are major topics of concern for farmers. But, many farmers are seeing tillage reduction as the best way to reduce fuel usage, while at the same time conserving soil and water.

The concept of double-cropping cotton with reseeding crimson clover under various tillage treatments has been studied during the past 4 years at the Auburn University Agricultural Experiment Station. The objectives of this study were to develop a cropping system for double-cropping cotton with crimson clover and to evaluate machinery requirements for the system.

Field plots for the study were located on a Norfolk sandy loam soil at the Agricultural Engineering Research Unit at Marvyn, Ala. The six treatments consisted of clover and no-clover plots with three levels of tillage on each. The plots were established in a randomized design and replicated four times. Prior to seeding crimson clover, the entire plot area was plowed and chiseled to a uniform depth below any existing hard pan. Crimson clover was seeded in the fall of 1975 and reseeded itself each year thereafter.

Each year in the spring, after the clover seeds were mature (about May 15), cotton was planted in a 2 and 1 skip-row pattern with the skips serving as permanent traffic lanes for wheel traffic. Tractor and sprayer wheels were extended to 120 inches on center to operate in the center of the skipped rows. This reduced compaction in the root zone caused by wheel traffic, thereby eliminating the need for primary tillage each year.

The first year, inadequate stands of cotton were established in the clover because the mulch prevented good soil-to-seed contact. This was solved by mounting a fluted coulter in front of the planter to cut through the mulch, followed by a disk furrower attachment on the seed opener that pushed away the mulch from a 6-inch-wide strip where the seed was planted. These two modifications made possible good control of seed depth and good soil-to-seed contact.

At planting, 250 pounds per acre of 8-24-24 fertilizer was banded beside the row on all plots. The no-clover plots were sidedressed with 75 pounds of nitrogen per acre. The clover plots were not side-dressed. All plots were mechanically and chemically cultivated as needed. The plots were harvested with a one-row cotton picker mounted on the tractor with 120-inch wheel spacing.

This minimum tillage control traffic system for double-cropping cotton and crimson clover has the possibilities of producing a soil cover to reduce soil erosion and promote water infiltration, producing supplemental nitrogen for the cotton, increasing soil organic matter, and conserving energy by reducing tillage requirements.

Cotton can be grown with no primary tillage in crimson clover residue at a minimal yield reduction and a maximal savings of energy and expense inherent in conventional cotton production systems.

W. T. Dumas,  
department of agricultural engineering,  
Auburn University, Ala

Reprinted from *Highlights of  
Agricultural Research*, vol 27, No. 3,  
Agricultural Experiment Station,  
Auburn University, Ala.

## Low Tillage Saves Money, Boosts Yields on South Dakota Farm

A 5-year demonstration at the Duane Ellis farm near Elkton, S. Dak., showed a definite economic advantage for minimum tillage on corn.

The study showed advantages in gross returns, labor and fuel inputs, and even in yields.

Ellis and researchers compared three systems of tillage: conventional, chisel plow, and till plant over a 5-year period.

Till plant averaged 65 bushels to the acre, chisel plant 55 bushels to the acre, and conventional 53 bushels to the acre over that period. Till plant topped the yield every year of the study.

Over a 4-year average, till plant grossed \$22.49 per acre more than conventional, and chisel plant grossed \$5.19 per acre more than conventional. The conventional gross returns per acre were \$88.23.

Over the same period labor and fuel inputs were highest for conventional planting system at \$6.21 an acre, second with chisel plant at \$4.44 an acre, and least with till plant at \$3.52 an acre.

The inputs with chisel plant were 26 percent more than till plant and conventional was 76 percent more than for till plant.

"Till planting looks good to me," remarked one of the researchers, G. R. Durland, Extension agricultural engineer at South Dakota State University. "It's a different type of operation, so an operator has to adjust his management for that type of operation."

He added that there are more potential problems with disease and insects which can breed and live in the residue that's on the surface, but this



project didn't experience that problem because of the skill of the manager.

The test was conducted on soil that is Estelline silt loam, nearly level. Insecticide and herbicides were used.

Cooperating in the study were the Brookings County Conservation District, Soil Conservation Service, South Dakota State University, and the Cooperative Extension Service.

---

## **No-Tillage Cuts Potassium Leaching Losses**

Potassium leaching is a serious problem on sandy soils, but Delaware Agricultural Experiment Station researchers have found that no-tillage reduces the problem dramatically.

The researchers compared fields that were in continuous corn for 8 years, from 1972 to 1979. Half the plots were plowed, disked, and cultivated, while half were planted without tillage in corn crop residues from the previous season.

In each case, 200 pounds of potash was broadcast each year for the entire period. By 1979, there was about 60 percent more soil potassium at the zero- to 3-inch soil depth on the no-till fields.

On the tilled fields, the level of soil potassium ranged from 6 parts per million (or 134 pounds per acre) at the zero- to 1-inch soil depth, to 127 parts per million (or 254 pounds per acre) at the 6- to 9-inch depth—clear evidence of leaching.

According to Agricultural Experiment Station Researcher Dr. William Mitchell, the dramatic rate of leaching on the loamy sand soil that was plowed each year gives us an indication of what can happen to potassium in a single season under irrigation and heavy rainfall. Under the same

conditions without tillage there was no evidence of leaching.

---

## **Wind Erosion Estimates Made by Periods Within a Crop Rotation**

Estimates of wind erosion damage to cropland can be made by periods of varying susceptibility throughout a crop rotation, U.S. Department of Agriculture erosion specialists say.

Potential wind erosion is now estimated on an annual basis, while a new procedure could produce estimates for intervals shorter or longer than 1 year.

"We should be able to identify the most erosion-susceptible points in a crop sequence with more accuracy," said Leon Lyles, agricultural engineer of USDA's Science and Education Administration, Manhattan, Kans. The new method also incorporates any changes in soil erodibility, vegetative cover, or surface roughness during the year.

Erosion estimates for a critical time in plant growth could also guide selection of practices for reducing or eliminating seedling injury from blowing soil to such abrasion-sensitive crops as sugarbeets and high-value horticultural crops.

The new estimating technique is proposed by Earl J. Bondy, Salina, Kans., and William A. Hayes, Lincoln, Nebr., both agronomists of USDA's Soil Conservation Service, and Lyles, in cooperation with Kansas State University, Manhattan.

The USDA wind erosion equation, in use more than 15 years, expresses potential annual soil loss as the interacting effects of soil erodibility, soil ridge roughness, climate, field length along the prevailing wind erosion direction, and vegetative cover.

Erosion by periods within a cropping sequence can be estimated by use of the equation when the percent of annual erosive wind energy for each period is known, Lyles said.

---

## **Grass Gets a Head Start With Pregermination**

A recent study conducted by Victor L. Hauser, supervisory agricultural engineer at USDA's Science and Education Administration, agricultural research station in Temple, Tex., shows that grass stands can be successfully established from seed, if the seed is allowed to germinate prior to planting. This breakthrough is of special importance to the Southern Great Plains, where more than 50 percent of the grass stands fail when established from seed.

A new laboratory method of pregermination involves temperature-controlled water, oxygen injections, a gel, and moist soil. The pregermination eliminates much of the expense currently incurred through reseeding failed stands, loss of land use, and soil erosion.

From the American Society of Agricultural Engineers *Newsline*, November 18, 1980.



Send present mailing label and  
new address including zip code to:

U.S. Department of Agriculture  
Soil Conservation Service  
P.O. Box 2890, Room 0054-S  
Washington, D.C. 20013

Official Business  
Penalty for private use, \$300

Controlled  
Circulation  
Postage  
Paid in  
Washington, D.C.

AGR 101



## Meetings

February	1-3	National Cattlemen's Association, San Antonio, Tex.
	1-4	Land Improvement Contractors of America, San Antonio, Tex.
	1-5	National Association of Conservation Districts, San Francisco, Calif.
	9-11	Southern Forest Institute, New Orleans, La.
	9-13	Society for Range Management, Tulsa, Okla.
	13-16	American Association of School Administrators, Atlanta, Ga.
	15-18	Agri-Turf Irrigation Exposition and Technical Conference, Salt Lake City, Utah
	22-27	American Society of Photogrammetry and American Congress on Surveying and Mapping, Washington, D.C.
March	21-25	North American Wildlife and Natural Resources Conference, Washington, D.C.
	27-29	National Wildlife Federation, Norfolk, Va.
	29-31	American Pulpwood Association, Atlanta, Ga.
April	19-22	Association of American Geographers, Los Angeles, Calif.
	19-22	National Council of State Garden Clubs, Inc., Atlanta, Ga.
	25-30	American Planning Association, Boston, Mass.
	29-May 1	Hardwood Plywood Manufacturers Association, Savannah, Ga.

## New Publications

### Irrigation Principles and Practices

by Vaughn E. Hansen, Orson W. Israelsen, and Glen E. Stringham

The fourth edition of this 417-page textbook stresses the basic underlying principles that govern irrigation practices, discusses generalized concepts, and examines newly formulated practices.

It traces irrigation water from its source to its drainage and describes the four basic methods of irrigation, comparing sprinkler and drip irrigation. Problems caused by salinity, alkalinity, and water logging are also discussed.

The problems at the end of the book have been revised to present a broader coverage of the subject matter, and problems have been added to illustrate the new material of the fourth edition.

Copies are available for \$24.95, prepaid, from John Wiley & Sons, Inc., Order Department, One Wiley Drive, Somerset, N.J. 08873.

### Soil Erosion by Water

by the Food and Agriculture Organization of the United Nations

This is a 284-page book that is part of the Food and Agriculture Organization's Land and Water Development Series. It is a general reference work for people in developing countries who work in soil conservation programs. A team of U.S. specialists, including a Soil Conservation Service specialist, contributed the material for the main part of the book. Specialists from seven other countries sent papers for the appendixes.

The book includes diagrams, charts, tables, and black-and-white photographs.

Copies are available for \$18.75 from Unipub, Order Department, 345 Park Avenue South, New York, N.Y. 10010.

### Restoration of Fish Habitat in Relocated Streams

by the U.S. Department of Transportation, Federal Highway Administration

This manual provides guidelines for the design and construction of relocated channels and describes measures that will lead to rapid recovery of new channels by natural processes. It is illustrated with diagrams and color photographs and includes a case study in stream relocation.

Copies are available for \$4.50 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. (Stock No. 050-001-00167-5.)

### Invite Birds to Your Home

by the Soil Conservation Service

This color pamphlet lists 19 shrubs, trees, and vines that are reported to be used by many varieties of birds. Each listing includes number of species re-

ported to use the plant, ornamental value, adaptations, blooming or fruiting dates, and sources where the plants may be obtained.

The pamphlet has a chart showing the heights of the mature plants. It also has a diagram of a landscape conservation design for suburban lots.

Plants listed in this brochure are adapted and useful in the Northeast and as far south and west as Virginia and Kentucky.

Copies are available from local and State Soil Conservation Service offices.

### Recent Soil Surveys Published

by the Soil Conservation Service

**Colorado:** Conejos County and Weld County.

**Michigan:** Berrien County.

**Montana:** Richland County.

**Nebraska:** Burt County and Keya Paha County.

**Ohio:** Seneca County.

**South Carolina:** Abbeville County.